REMARKS

Claims 1-20 and 23-26, as amended appear in this application.

Claims 1, 16 and 18 are amended herein without change of scope to more particularly point out that "said layer" refers to a single semiconductor layer. No new matter being introduced, Applicants respectfully request entry of these amendments.

Claim 26 is objected to because the Examiner contends that the word "initially" is not supported in the specification at page 34, lines 27-32. In order to advance prosecution of this application, Applicants have deleted the word "initially" without prejudice.

Applicants submit that the word "initially" is in fact supported in the specification. Claim terms need not be supported *ipsissimis verbis* in the specification, but instead are supported if one of ordinary skill in the art would understand that the claim is described in the specification. Therefore, "initially" is supported because the routine meaning of the statement "it is possible to implement . . . [a large adjustment] . . ., and then to implement . . . [a finer adjustment]" is that the large adjustment is implemented first, or, synonymously, is implemented "initially". Specification at page 34, lines 27-32 .

Claims 1-8, 12, 16, 18-20 and 23-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Vuong et al. US patent application 2004/0017574 ("Vuong"). The reasons for this rejection are essentially identical to the reasons set forth in the previous Office Action dated November 18, 2004.

Applicants first recall certain well known requirements for anticipation relevant here:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

M.P.E.P., § 2131. Also, the reference must teach that the disclosed claim elements are arranged and interrelated as recited in the claim. Id. In other words, a reference

cannot anticipate if it lacks even a single claim element, or if it fails to disclose the manner of operation recited in the claim.

In response to the present Office Action, Applicants again submit that Vuong cannot anticipate the instant claims because this reference does not explicitly or inherently disclose, *inter alia*, adjusting or changing the thickness of a semiconductor layer according to a thickness adjustment specification. The Applicants further submit that even if Vuong did disclose changing layer thickness, it would still not anticipate because its operation is significantly different than the claimed invention.

Specifically, the pending claims require that a semiconductor layer be measured, that a "thickness adjustment specification" be determined from the measurements, and then that the thickness of the measured layer be adjusted or changed according to the "thickness adjustment specification". In other words, the claims require that, in a single fabrication step, the thickness of the very same layer that was measured be changed according to the results of its measurements. Also, the "thickness adjustment specification" can specify that different thickness adjustments or changes are to be made at different locations of the previously-measured semiconductor layer. See the specification at, *e.g.*, page 23, lines 32-37; and page 24, lines 18-21.

Fig. 2 illustrates the present invention, while Fig. 1 illustrates a prior art fabrication process, which is, incidentally, similar to that disclosed by Vuong. Both processes are illustrated as having processing steps 101, 102, 103, 104 and final finishing step 105. Turning first to Fig. 1, to achieve proper layer thickness the prior art process includes between the fabrication steps measurement steps 107 which cause products that do not meet measurements to be discarded. Fig. 2 illustrates the present invention which provides instead a single, improved finishing step 105' that obviates the need for multiple measurement steps 107.

The improved finishing step corrects layers that do not meet measurements by changing their actual thickness so that they do meet measurements. This step measures a layer (1051'), determines thickness adjustment specifications (1052'), and then changes the thickness according to the specifications (1053'). It can be appreciated from Fig. 2 the improved step 105' is a single, standalone step that is independent of all other fabrication process steps. It does not provide any data to

adjust process variables of any other fabrication step; neither does it receive any thickness adjustment specifications from any other fabrication step. It does not participate in any feedback or feedforward control loop in any manner.

The Examiner contends again in the present Office Action that Vuong discloses these claim steps and now cites numerous paragraphs in Vuong where this disclosure is allegedly found.[1] Applicants submit that neither these paragraphs specifically nor Vuong as a whole, in fact, disclose, explicitly or inherently, adjusting or changing the thickness of a semiconductor layer according to a thickness adjustment specification as claimed.

Consider first the paragraphs in Vuong cited, in paragraphs 3 and 7 of the Office Action, as allegedly containing disclosures of changing layer thickness, namely paragraphs 7-10, 37, 46, 55, 61, 66, 67, 72, 84, 87, 91 and 96. Applicants consider each of the paragraphs in turn. First, none of paragraphs 7-10, 61, and 87 discloses changing a layer thickness. Paragraphs 7-10 describe generally Vuong's profile model optimizer; paragraph 46 describes profile model examples; paragraph 61 describes data gathering criteria; and paragraph 87 describes a system architectural diagram.

Next, the Examiner has highlighted portions of paragraphs 37, 55, 66, 67, 72, 84, 91 and 96 that Applicants presume to be of particular relevance. Applicants submit again that none discloses changing a layer thickness. Paragraph 37 describes only details of an optical metrology system. In paragraphs 55, 66, 67, 84, the following phrases have been highlighted: "structure characterization obtained from an integrated circuit fabrication process"; "historical or test data for the fabrication process"; "based on historical or test results for the particular fabrication process"; and "determined from fabrication data or previous experience". These phrases (and their parent paragraphs) describe only that sources of certain data used by Vuong may include data from or experience with fabrication processes. But fabrication process data or experience is not by itself changing a layer thickness; and merely mentioning "fabrication process" in connection with obtaining data is not a disclosure of changing a layer thickness. Lastly, in paragraph 72, the Examiner has highlighted that "several

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[1] Applicants believe that paragraphs 3, 7-10, 36, 37, 39, 40, 46, 48, 50, 52, 55, 56, 61, 64, 66, 67, 72, 84-86, 87, 91, 92 and 95-97 is a complete list of cited paragraphs.

tasks may be concurrently or serially performed" in Vuong's profile model optimizer. Applicants submit that concurrency has nothing to do with changing a layer thickness.

Furthermore, present claim 16 recites that the thickness adjustments are applied simultaneously to the layer surface.

Vuong does suggest that a use of his "profile model and parameter selection" can be used for fabrication cluster "feed-forward or feed-backward control loops". Vuong, ¶ 54. This is slightly elaborated in ¶ 91:

> As a wafer (not shown) completes a fabrication process step, structures on the wafer are measured by the optical metrology system 1930 creating measured diffraction signals 1931 transmitted to the metrology model optimizer 1920. In addition to the critical dimension data 1924 being transmitted to the profiler workstation 1925, the same data is transmitted to the fabrication cluster 1940 for advanced process control use.

(emphasis added) This paragraph is really more of a description of feedback or feedforward control than a disclosure of anything specific. There is no explicit mention anywhere in this paragraph of changing a layer thickness according to a thickness adjustment specification. In view of the variety and complexity of semiconductor processes, changing a layer thickness is certainly not always and necessarily a consequence of transmitting data to a fabrication cluster. In other words, such a disclosure is also not inherent in these words. See M.P.E.P. § 2112(IV).

But even more, this is not how the claimed method functions; it is not a feedback or feedforward process. The claimed method is single, independent step that changes the thickness of the very same layer it is currently processing. No feedback or feedforward information is provided to or received from any other process steps. But Vuong discloses here and throughout only a feedback or feedforward process. Only after a wafer has completed a fabrication step, is any measurement information transmitted to the fabrication cluster. Therefore, a wafer's measurement can only by used to adjust process variables for future wafers and cannot be used to change the thickness of the "completed wafer". Thus, Vuong functions differently from the claimed invention.

Paragraph 91 explains how Vuong uses collected data for process control in that the data is used to compensate for inconsistencies in the final product by

changing process variables so that the inconsistencies are not experienced in future products. This situation is completely different from applicants' adjustment of the actual thickness of the layer which was measured and compared to the stored data. This enables applicants' process to produce current products in conformance with the desired thickness specifications (i.e., the standard profiles).

Finally, the Applicants briefly address other cited paragraphs. Paragraph 96 states: "alternatively, the regression results may be used to adjust variables and/or physical controls of the fabrication process". This is no more than a hypothetical suggestion and not an actual disclosure of anything, much less of changing the thickness of a layer from which the regression results were obtained.

Paragraphs 3, 10, 48, 37, 50 and 52 have been cited in support of a "thickness adjustment specification". However, these paragraphs describe only Vuong's profile models and profile model optimizer. A profile model is not a "thickness adjustment specification". As the word "model" indicates, Vuong's profile models summarize (that is, model) the results of optical metrology. But a "thickness adjustment specification" is a set of commands to change the thickness of a semiconductor layer so that different thickness changes are made at different locations. See the specification at, *e.g.*, page 24, lines 18-21. Profile models and "thickness adjustment specifications" are entirely different data.

Paragraphs 36, 39, 40, 56, 64, 85, 86, 92, 95 and 97 have also been cited. Careful reading of these paragraphs reveals that they describe no more than Vuong' profile model optimizer, profile model optimizer system, and examples of profile models. They also do not disclose changing a layer thickness.

In summary, the Applicants respectfully submit, the Examiner's citation notwithstanding, that Vuong nowhere discloses, explicitly or inherently changing the thickness of a semiconductor layer according to a thickness adjustment specification deduced from measurements of that very same layer. Thus Vuong does not anticipate the rejected claims and these rejections should be withdrawn.

Claims 9-11, 13-15 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Vuong in view of US patent 6,751,343 to Ferrell and Chapter 7 of the Wolf text entitled Silicon Processing for VLSI. These rejections should also be

withdrawn because Vuong does not disclose changing the thickness of a semiconductor layer according to a thickness specification and neither does Ferrell and/or Wolf. Indeed, the Examiner does not so assert.

Ferrell discloses only a method for indexing and retrieving manufacturing-specific digital images based on image content, in particular, a method for extracting one or more features from digital semiconductor images and recording and indexing the images.

Wolf discloses only formation of a SiO_2 layer on Si by oxidation. The oxide layer thickness is measured (p. 235, line 2), and different techniques, such as optical interference, ellipsometry, capacitance, and color charts, are available for this purpose (p.235, lines 4-6).

Since the dependent claims inherit all the limitations of their parent independent claims, they are also neither anticipated nor made obvious by the references of record for the reasons above. Applicants also repeat their previous remarks concerning these claims.

CONCLUSION

In view of the above, the application is believed to be in condition for allowance, early notice of which would be appreciated. Should any issues remain, a personal or telephonic interview is respectfully requested to discuss the same in order to expedite the allowance of all the claims in this application.

Respectfully submitted,

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